

Mapping the NAEP Performance Levels onto the Standard Score Scale of the Iowa Assessments

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Purpose: Translate the NAEP Achievement Levels to the standard score scale of the Iowa Assessments in order to express NAEP Achievement Levels in terms of expected score ranges on the Iowa scale.

Context

- NAEP results are only reported at the state level.
- NAEP results are reported as average scale scores, which makes it difficult to understand the magnitude of differences between states.
- The Iowa Assessments are administered annually to all Iowa students in grades 3 through 8 and 11.
- A representative sample of Iowa's grade 4 and grade 8 students are selected to take the NAEP math and reading tests every two years.
- The Iowa population and Iowa NAEP sample are being considered randomly equivalent groups for purposes of linking.

Educational Significance

- This research provides a way to report NAEP Achievement Level cut scores on the Iowa standard score scale for individuals.
- This research provides a way to quantify differences between states in terms of raw score units on the Iowa Assessments.

Methods

Iowa's 2003 NAEP results were obtained from the NAEP Data Explorer and the following steps were completed for grades 4 and 8 in both Mathematics and Reading:

1. The Iowa percentile ranks associated with the NAEP achievement level cut scores and the NAEP scale scores associated with the 5 percentiles reported by NAEP were found.
2. The Iowa standard score (ISS) and raw score for each state percentile rank on NAEP was then identified.
3. The national standard score (NSS) associated with each Iowa raw score was found.

Table 1 depicts the above steps as well as results for grade 4 reading.

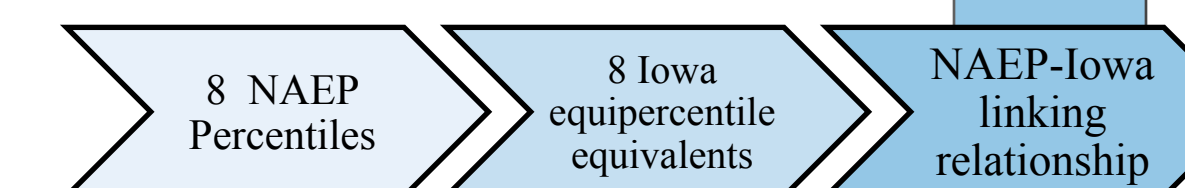
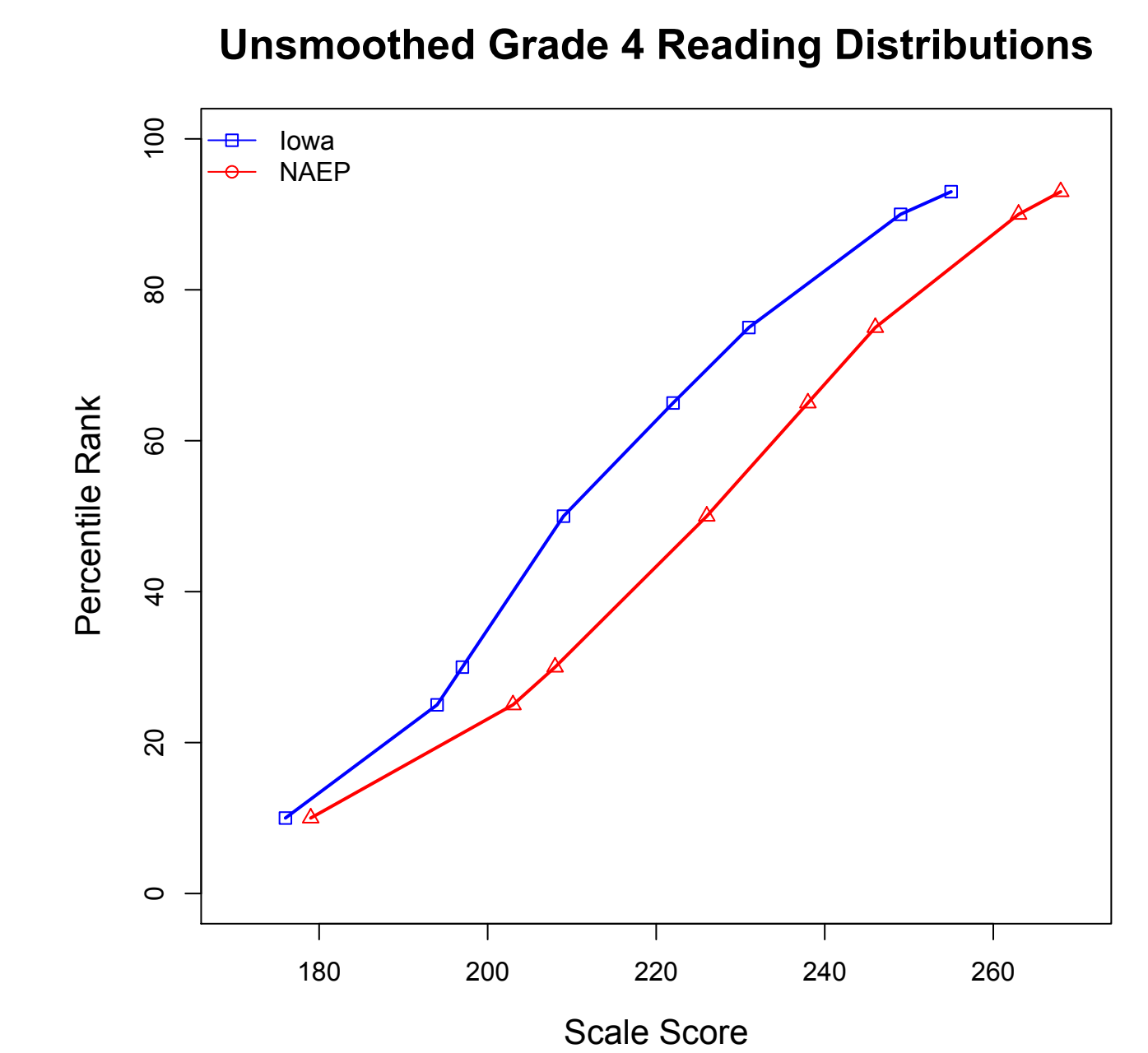


Table 1
Iowa's 2003 Grade 4 Reading NAEP Scale Scores and equipercentile equivalents on the Iowa standard score scale

NAEP Achievement Levels	Step 1		Step 2		Step 3
	NAEP SS	NAEP PR	ISS	Iowa Raw Score	NSS
Basic	179	10	163	15	176
	203	25	178	22	194
	208	30	182	24	197
Proficient	226	50	196	28	209
	238	65	207	32	222
	246	75	216	33	231
Advanced	263	90	237	37	249
	268	93	243	37	255

Note: SS = Scale Score, PR = Percentile Rank, ISS = Iowa Standard Score, NSS = National Standard Score

4. The 8 points from the state NAEP were plotted along with the Iowa equipercentile equivalents.



5. Cumulative distribution functions were determined by fitting a curve to the 8 points using cubic spline smoothing. The curves depicted below illustrate the method and show the cumulative distribution functions used to establish the link between the ISS and the NAEP scale score.

Results

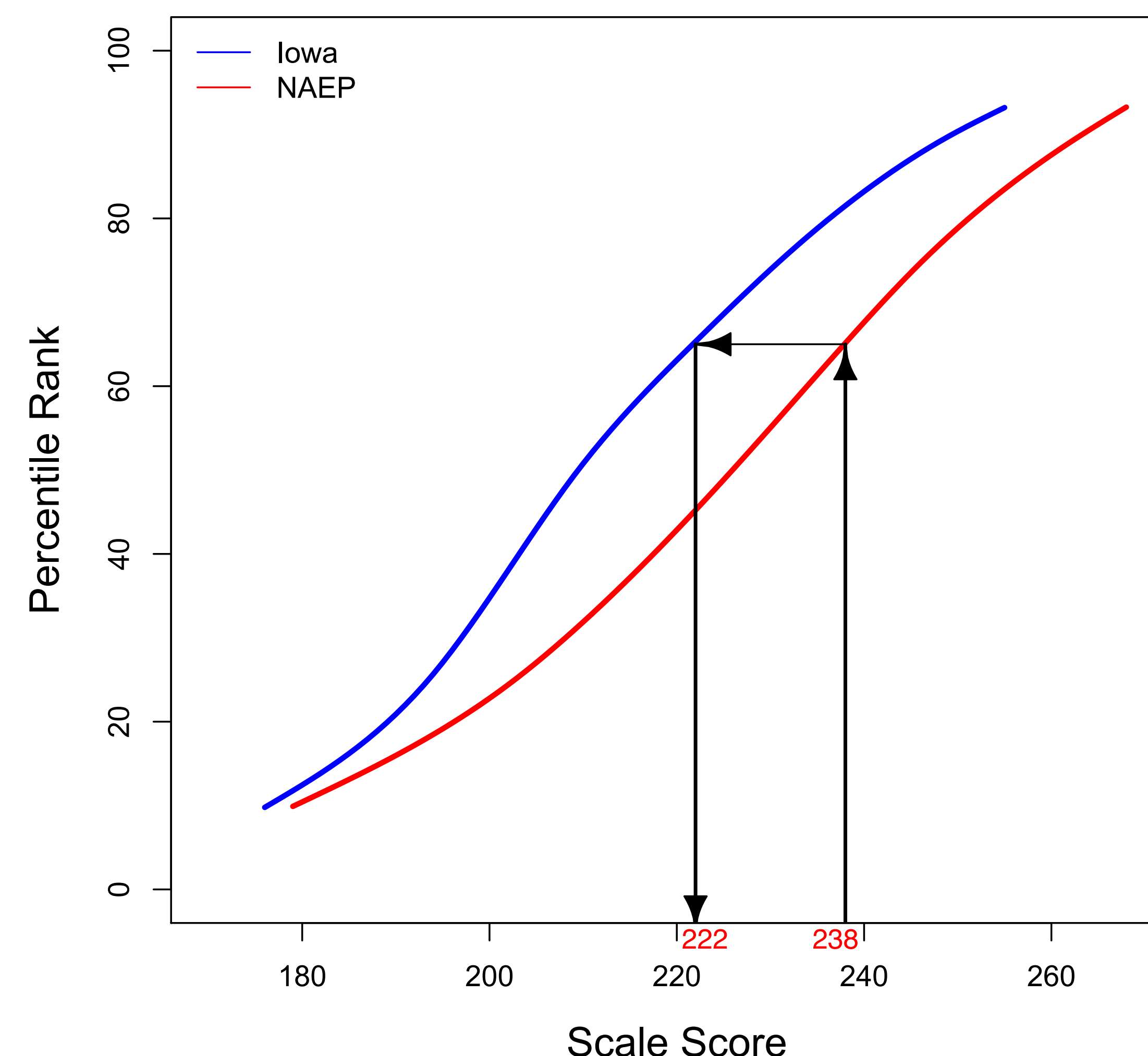
- Reporting NAEP Achievement levels as student-level indicators of performance
 - The cut score for proficient on the NAEP grade 4 reading test is 238. The equipercentile equivalent on the reading test of the Iowa Assessments is a standard score of 222 (this linking relationship is depicted by the solid black line in the plot below).
 - As indicated in Table 2, it is estimated that an 8th grade student scoring at or above a standard score of 315 on the math test of the Iowa Assessments would be considered advanced in terms of NAEP performance standards.

Table 2
Select 2003 NAEP to Iowa Assessment linking relationships

	NAEP			Iowa Assessments
	Achievement Levels	SS	PR	NSS
Grade 4 Reading	Basic	208	30	197
	Proficient	238	65	222
	Advanced	268	93	255
Grade 8 Reading	Basic	243	21	226
	Proficient	281	64	274
	Advanced	323	97	323
Grade 4 Math	Basic	214	17	186
	Proficient	249	64	216
	Advanced	282	97	251
Grade 8 Math	Basic	262	24	234
	Proficient	299	67	281
	Advanced	333	95	315

Note: SS = Scale Score, PR = Percentile Rank, NSS = National Standard Score

Smoothed Grade 4 Reading Distributions



- On the average, the number of Iowa Assessment items for each NAEP scale score point can be estimated from this linking procedure.

Table 3
Average number of Iowa items for each NAEP scale score point

Content Area	Reading	Grade	
		4	8
	Math (Total)	.42	.55

- In grade 4 reading, the gain made by Massachusetts between 2003 and 2011 is equivalent to 2 items correct on the Iowa Assessment.
- In 2003, the three top performing states on NAEP grade 4 reading were Connecticut, New Hampshire, and Massachusetts. The average reading NAEP scale score for 4th grade public school students in Connecticut, New Hampshire, and Massachusetts was 228 while the average scale score for 4th grade public school students in Iowa was 223. When expressed in terms of raw score units on the Iowa Assessment, this difference of 5 scale score units equates to a difference of 1 raw score point.
- The 2003 achievement gap in grade 8 reading in Iowa between Hispanic and White students is equivalent to 10 items correct on the Iowa Assessment while the 2011 achievement gap corresponds to 7 items correct on the Iowa Assessment.

For further information
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